

# Aeroservoelastic Multifidelity Design of Biomimetic Aircraft (AMuBA), Phase I

Completed Technology Project (2018 - 2019)



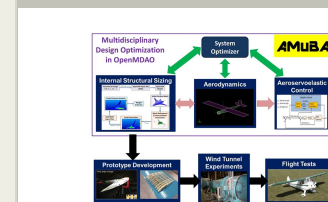
## Project Introduction

NASA has been investigating morphing aircraft for multi-mission capabilities and performance improvements in existing fixed-wing aircraft. In addition, the design of aeroelastic aircraft that can control the structural flexibility to their advantage, is an open area of research and development. In spite of the plethora of work on morphing aircraft and long slender wings, the goal of fielding such systems still seems elusive. In particular, the integration of these technologies for breakthroughs in performance, has not been demonstrated. To address this need, our team is developing morphing concepts using inflatable muscles that will allow seamless aerodynamic transitions. A formal design of such aircraft, integrating aeroservoelastic considerations and high-fidelity structural optimization, will be accomplished. We will also develop the associated aeroservoelastic controllers that can maintain stability over the entire flight envelope, without substantially sacrificing performance

## Anticipated Benefits

The AAVP has a goal of developing novel aircraft concepts, and would benefit from this technology – in particular the high aerodynamic efficiency platform. In fact, the MUTT, ACTE and Elastically Shaped Aircraft projects at NASA can directly use the findings and technology from this effort. Moreover, several design efforts and those focused on incorporation of high fidelity structural information early in the design process, will be able to use the AMuBA tool to their advantage

The Air Force has been investing in programs, such as N-MAS, and AAW. The technology is directly applicable to the Morphing Structures Program at DARPA, and will allow advancement of DOD's in-house technology. Also, with the increasing use of UASs by the DoD, several control system design technologies will be immensely useful



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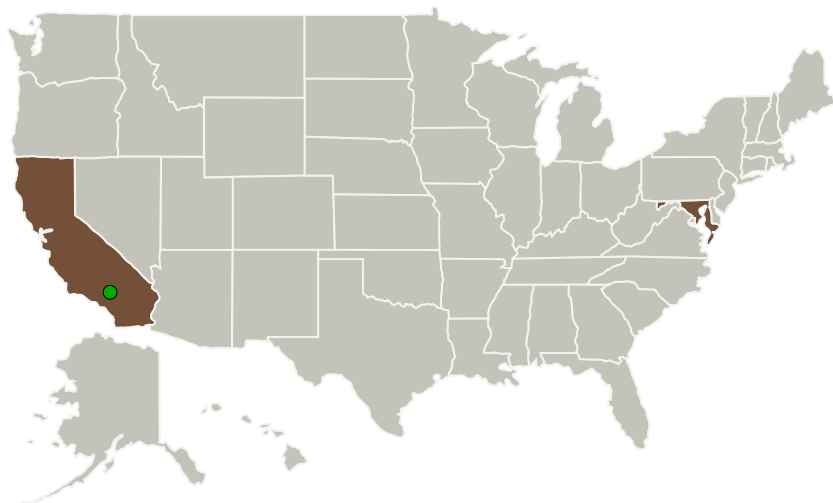
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## Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Intelligent Automation, Inc.	Lead Organization	Industry	Rockville, Maryland
● Armstrong Flight Research Center(AFRC)	Supporting Organization	NASA Center	Edwards, California
University of Maryland-College Park(UMCP)	Supporting Organization	Academia Asian American Native American Pacific Islander (AANAPISI)	College Park, Maryland

### Primary U.S. Work Locations

California	Maryland
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## Project Transitions

**July 2018:** Project Start

## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Organization:

Intelligent Automation, Inc.

### Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

### Program Director:

Jason L Kessler

### Program Manager:

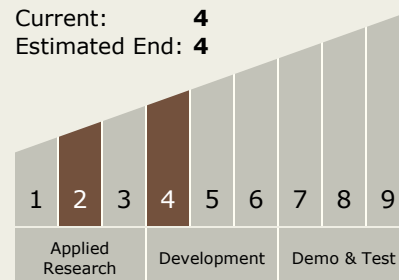
Carlos Torrez

### Principal Investigator:

Nikhil Nigam

## Technology Maturity (TRL)

Start: 2  
Current: 4  
Estimated End: 4



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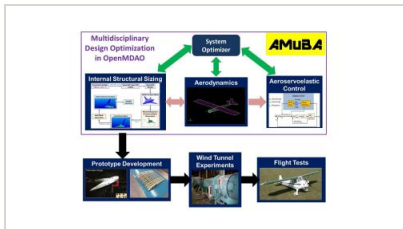


✓ **August 2019:** Closed out

## Closeout Documentation:

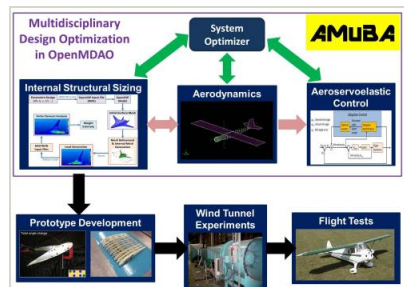
- Final Summary Chart(<https://techport.nasa.gov/file/141256>)

## Images



### Briefing Chart Image

Aeroservoelastic Multifidelity Design of Biomimetic Aircraft (AMuBA), Phase I  
(<https://techport.nasa.gov/image/131071>)



### Final Summary Chart Image

Aeroservoelastic Multifidelity Design of Biomimetic Aircraft (AMuBA), Phase I  
(<https://techport.nasa.gov/image/136531>)

## Technology Areas

### Primary:

- TX15 Flight Vehicle Systems
  - └ TX15.1 Aerosciences
    - └ TX15.1.3 Aeroelasticity

## Target Destination

Earth